patterned substrate. The curable binder of the slurry is cured to harden the slurry and to adhere the slurry to the substrate. Then the mold is removed to leave green state microstructures of the slurry adhered to the substrate, the green state microstructures substantially replicating the microstructures of the patterned surface of the mold. The green state microstructures may be thermally processed to form substantially dense ceramic microstructures.

In another aspect, the present invention is a substrate element for use in an electronic display having microstructured barrier ribs molded and aligned on a patterned portion of a substrate. For example, the present invention provides a high definition television screen assembly including a plasma display panel. The plasma display panel includes a back glass substrate having a plurality of independently addressable electrodes forming a pattern and a plurality of ceramic microstructured barriers molded and aligned with the electrode pattern on the back substrate according to the process of the present invention. Phosphor powder is deposited between the ceramic barriers, and a front glass substrate having a plurality of electrodes is mounted with its electrodes orthogonally facing the electrodes of the back substrate. An inert gas is disposed between the front and back substrates.

In yet another aspect, the present invention provides an apparatus for molding and aligning ceramic microstructures on a patterned substrate. The apparatus stretches a stretchable mold having a microstructure thereon into close proximity with a patterned substrate, registers and aligns the microstructure of the mold with a predetermined portion of the patterned substrate, applies a slurry comprising a ceramic powder dispersed in a curable binder between the microstructure of the mold and the substrate, stretches the mold to align the microstructure of the mold with the predetermined portion of the patterned substrate, and cures the binder of the slurry between the substrate and the mold.

Brief Description of the Drawings

Fig. 1 is a schematic representation of a plasma display panel assembly.

Fig. 2 is a cross-sectional schematic of a slurry disposed between a mold and a patterned substrate.

Fig. 3 is a schematic representation of a method of stretching a structured mold according to the present invention.

Fig. 4 is a schematic representation of a method of removing a mold from green state microstructures.

Fig. 5 is a schematic representation of ceramic microstructures molded and aligned on a patterned substrate.

Fig. 6 is a schematic representation of an apparatus for molding and aligning microstructures.

Fig. 7 is a schematic of a jig used to stretch a mold.

Detailed Description

The method of the present invention enables accurate molding of microstructures on a patterned substrate. While the method of the present invention can be used to mold and align microstructures made of various curable materials onto various patterned substrates for various applications, it is convenient to describe aspects of the method in terms of a particular application, namely molding and aligning ceramic barrier rib microstructures on an electrode-patterned substrate. Ceramic barrier rib microstructures are particularly useful in electronic displays in which pixels are addressed or illuminated via plasma generation between opposing substrates, such as PDPs and PALC displays. References to ceramic microstructure applications in the description of the method of the present invention that follows serve to illustrate aspects of the present invention and should not be read to limit the scope of the present invention or of the claims recited.

As used herein, the term ceramic refers generally to ceramic materials or glass materials. Thus, in the slurry used in one aspect of the method of the present invention, the included ceramic powder can be glass or ceramic particles, or mixtures thereof. Also, the terms fused microstructures, fired microstructures,